

CHAPTER 7.6
AIR STRIPPING

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CHAPTER 7.6 AIR STRIPPING

7.6-1. **GENERAL**. Air stripping is a technology in which dissolved volatile organic chemicals are removed from water by increasing the surface area of the contaminated water exposed to air. This allows the volatile chemicals to escape into the air. It is also effective for removing inorganic contaminants such as carbon dioxide and ammonia. Air stripping is not effective for the removal of organic contaminants with low volatility (low Henry's Law constants). Henry's Law provides a means to estimate the tendency of a chemical to volatilize from water. Examples of organic contaminants that easily volatilize are BETX, TCE, DCE, and PCE. The types of air stripping equipment commonly used are packed towers, diffused aerators, tray aerators (low profile air strippers) and spray aerators. In most cases, some type of treatment is required for the contaminated off gas (air containing the volatiles). The typical packed tower air stripper is filled with polypropylene packing that has a large surface area. The contaminated water is pumped to the top of the tower above the packing and is sprayed onto the top of the packing with a spray nozzle to distribute the contaminated water uniformly over the packing. A forced air blower is located at the bottom of the column that forces air up through the bed of packing at the same time the water is "trickling" down through the packing (i.e. countercurrent flow). As the water and air pass each other the volatiles in the water leave the water (volatilize) and enter the air stream. The air stream then carries the volatiles up and out of the top of the column. A sump at the bottom of the tower collects the cleaned water. Auxiliary equipment that can be added to the basic air stripper includes an air heater to improve removal efficiencies, automated controls, explosion proof components and off-gas treatment systems.

7.6-2. **PRODUCTS**.

a. **Packed Tower**. The packed tower is typically made of steel lined with a protective coating, aluminum or fiberglass. The tower is mounted vertically on a concrete or similar base. Verify that the base is constructed according to the specifications. The base must be able to support the column if it should accidentally become filled with water.

b. **Packing**. The packing usually has small open shapes and is made of polypropylene. The packing is often delivered to the site in cardboard boxes. The packing is dumped from the boxes into the top of the column during construction.

c. **Spray Nozzle**. Spray nozzles or other devices are located at the top of the column to distribute the water evenly over the top of the packing.

d. **Demister**. A demister (mesh) fits at the top of the column to remove the water mist from the air before the air leaves the top of the column.

e. **Blower**. Blowers convey air through the air stripper.

f. **Insulation**. Verify that insulation has been installed, if required.

7.6-3. EXECUTION.

a. Hydraulic Testing. Testing should be completed prior to filling the tower with packing.

b. Welding. In the event the tower is constructed of steel or a material that requires welding, do not allow welding on the tower exterior when packing is in the tower. This may melt the packing.

c. Permitting. Determine if there are permitting and monitoring requirements for the release of off gas. Verify there is an approved emission monitoring plan to determine when breakthrough occurs and carbon must be replaced or regenerated.

d. Maintenance. Replacement of column packing from the top of the tower, or from elevated stacks, may cause safety concerns.

7.6-4. Operation and Maintenance.

a. Packing.

(1) Operational concerns associated with air stripper towers are normally directed towards maintenance of the packing material.

(2) Check the packing material for evidence of fouling. Fouling reduces the air flow rate and increases the pressure drop through the column. Fouling is caused by oxidation of dissolved minerals (such as iron and manganese) in the feed water or by precipitation of calcium carbonate. Biological growth on the packing material can also result in fouling of the packing. This problem may be remedied through periodic replacement of the packing media or through acid washing of the media inside the tower.

b. Off-Gas Control.

(1) In the event vapor phase carbon is utilized for off-gas control, verify that a heat exchanger has been installed ahead of the carbon to adjust the humidity of the air stream entering the carbon to approximately 50 percent or less.

(2) The design district, or the design contractor, should be asked to verify that the controls associated with the blower and off-gas heater are coordinated with the air stripper and other unit processes to allow for successful operation of the unit.